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and center at the origin. Since each double point counts as two points the circle cuts the septic curve in 20 points. But this is impossible, hence there is no double point except at the origin. Therefore $\delta=5$. Then from Plücker's equations: $m=32$, $\iota=75$, $\tau=380$. Hence the curve

$$5x^4y - 10x^2y^3 + y^5 + c(x^2 + y^2)(x^5 - 10x^3y + 5xy^4) = 0, \quad c \neq 0.$$

is of class 32, is non-cuspidal, and has five double points at the origin, 75 points of inflection of which five are at the origin, and 380 double tangents. It is obvious that not all the singularities are real.

DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

ALGEBRA.

330. Proposed by R. D. CARMICHAEL, Princeton, N. J.

An important function in the Theory of Numbers is one defined thus: $f(x)=1$ when $x>0$, $f(x)=0$ when $x=0$, $f(x)=-1$ when $x<0$. Two analytic expressions for $f(x)$ are the following:

$$f(x) = \lim_{n \rightarrow \infty} x^{1/(2n-1)}, \quad n=1, 2, \dots; \quad f(x) = \lim_{n \rightarrow \infty} \frac{(x+1)^n - (x+1)^{-n}}{(x+1)^n + (x+1)^{-n}}, \quad x > -1.$$

It is required to find other non-trigonometric analytic expressions for this function. (There are several representations of $f(x)$ by means of trigonometric functions.)

No solution of this problem has been received.

331. Proposed by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

Extract the square root of $21+6\sqrt{2}+2\sqrt{21}-6\sqrt{3}-6\sqrt{7}-2\sqrt{6}-2\sqrt{14}$ and also of $4\sqrt{2}+2\sqrt{6}-9-4\sqrt{3}$.

Solution by S. G. BARTON, Ph. D., Clarkson School of Technology, Potsdam, N. Y., and J. SCHEFFER, A.M., Hagerstown, Md.

(a) Assume the root to be of the form

$$a\sqrt{2}+b\sqrt{3}+c\sqrt{7}+d.$$

Squaring and comparing coefficients, we have